

CLAIMS:

1. A multi-piece solid golf ball comprising a solid core,  
a mantle of at least one layer, and a cover, wherein  
5 the solid core is made of a rubber composition  
comprising (A) 100 parts by weight of a base rubber that  
contains 60 to 100 wt% of a polybutadiene of at least 60%  
cis-1,4 structure and synthesized using a rare-earth catalyst,  
(B) 0.1 to 0.8 part by weight of an organic peroxide, (C) an  
10 unsaturated carboxylic acid or an unsaturated carboxylic acid  
metal salt or both, (D) an organic sulfur compound and (E) an  
inorganic filler, has a deflection when subjected to a load  
of 980 N (100 kgf) of 3.0 to 6.0 mm, and has a diameter of 30  
to 40 mm;  
15 the mantle of at least one layer is made of a  
thermoplastic resin composition, has a thickness per layer of  
0.5 to 2.0 mm, and includes an outermost layer which is in  
contact with the cover and has a Shore D hardness of 20 to  
60;  
20 the cover is made primarily of (F) a thermoplastic  
polyurethane material, has a thickness of 0.5 to 2.5 mm and a  
Shore D hardness of 50 to 70, and satisfies the condition  
(Shore D hardness of mantle outermost layer)  $\leq$  (Shore D  
hardness of cover); and  
25 the golf ball has a deflection when subjected to a  
load of 980 N (100 kgf) of 3.0 to 5.0 mm.
2. The golf ball of claim 1, wherein the polybutadiene is  
a modified polybutadiene prepared by synthesis using a  
30 neodymium catalyst, followed by reaction with a terminal  
modifier.

3. The golf ball of claim 1, wherein the rubber composition includes:

(A) 100 parts by weight of a base rubber containing 60 to 100 wt% of a polybutadiene of at least 60% cis-1,4

5 structure and synthesized using a rare-earth catalyst,

(B) at least two kinds of organic peroxide,

(C) 10 to 60 parts by weight of an unsaturated carboxylic acid or an unsaturated carboxylic acid metal salt or both,

10 (D) 0.1 to 5 parts by weight of an organic sulfur compound, and

(E) 5 to 80 parts by weight of an inorganic filler.

4. The golf ball of claim 1, wherein the thermoplastic polyurethane material (F) comprises (M) a thermoplastic polyurethane and (N) an isocyanate mixture, said isocyanate mixture comprising (N-1) an isocyanate compound having at least two isocyanate groups as functional groups on the molecule and (N-2) a thermoplastic resin which is  
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20 substantially non-reactive with the isocyanate groups, the isocyanate compound (N-1) being dispersed in the thermoplastic resin (N-2).

5. The golf ball of claim 1, wherein the cover has a paint coating on a surface thereof, said paint coating being  
25 formed of a golf ball paint composition comprising a hydroxyl group-bearing polyester obtained through reaction of a polyhydric alcohol component with a polybasic acid component, and a non-yellowing polyisocyanate, at least a portion of  
30 said polyhydric alcohol component having an alicyclic structure within the molecule.

6. The golf ball of claim 1, wherein the thermoplastic resin composition comprises:

100 parts by weight of resin components which include  
a base resin of (P) an olefin/unsaturated carboxylic  
5 acid binary random copolymer or a metal ion neutralization  
product of an olefin/unsaturated carboxylic acid binary  
random copolymer or both in admixture with (Q) an  
olefin/unsaturated carboxylic acid/unsaturated carboxylic  
acid ester ternary random copolymer or a metal ion  
10 neutralization product of an olefin/unsaturated carboxylic  
acid/unsaturated carboxylic acid ester ternary random  
copolymer or both in a weight ratio P/Q of 100:0 to 25:75,  
and

(R) a non-ionomeric thermoplastic elastomer  
15 in a weight ratio (P+Q)/R of 100:0 to 50:50;

(S) 5 to 80 parts by weight of a fatty acid or fatty  
acid derivative having a molecular weight of 280 to 1,500, or  
both; and

(T) 0.1 to 10 parts by weight of a basic inorganic  
20 metal compound capable of neutralizing un-neutralized acid  
groups in the base resin and component S.

7. The golf ball of claim 1, wherein the mantle consists  
of an inner layer and an outer layer.

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8. The golf ball of claim 1 wherein the cover bears on a  
surface thereof a plurality of dimples, each dimple having a  
spatial volume below a planar surface circumscribed by an  
edge of the dimple and having a surface area circumscribed by  
the dimple edge on a hypothetical sphere represented by the  
30 surface of the golf ball cover were it to have no dimples;  
which golf ball has a dimple volume occupancy VR, defined as  
the ratio of the sum of the individual dimple volumes to the  
volume of the hypothetical sphere, of 0.70 to 1.00%, and a  
35 dimple surface coverage SR, defined as the ratio of the sum  
of the individual dimple surface areas to the surface area of  
the hypothetical sphere, of 70 to 85%.